HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, Colorado 80527-2400

PATENT APPLICATION

ATTORNEY DOCKET NO. 100111772-1

IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Oscar A. Zuniga

Confirmation No.: 2277

Application No.: 10/062250

Examiner: Alavi, Amir

Filing Date: Jan 31, 2002

Group Art Unit: 2621

Title: Dynamic Bilevel Thresholding Of Digital Images

Mail Stop Appeal Brief-Patents
Commissioner For Patents
PO Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on herewith.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) $500.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

☐ (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d)) for the total number of months checked below:

☐ 1st Month $120	☐ 2nd Month $450	☐ 3rd Month $1020	☐ 4th Month $1590

☐ The extension fee has already been filed in this application.

☐ (b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account 08-2025 the sum of $ 500 . At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.

☐ I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Alexandria, VA 22313-1450
Date of Deposit:

OR

☒ I hereby certify that this paper is being transmitted to the Patent and Trademark Office facsimile number (571)273-8300.
Date of facsimile: February 10, 2006
Typed Name: Donna M Kraft
Signature: Donna M Kraft

Respectfully submitted,
Oscar A. Zuniga
By A. W. Winfield
Augustus W Winfield
Attorney/Agent for Applicant(s)
Reg No. : 34,046
Date : February 10, 2006
Telephone : 970 898 3142

Rev 10/05 (AplBrief)

HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Mail Stop 35
Fort Collins, Colorado 80527-2400

PATENT APPLICATION

ATTORNEY DOCKET NO. 100111772-1

IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Oscar A. Zuniga

Serial No.: 10/062,250 Examiner: Alavi, Amir

Filing Date: 01/31/2002 Group Art Unit: 2621

Title: DYNAMIC BILEVEL THRESHOLDING OF DIGITAL IMAGES

COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria VA 22313-1450

BRIEF ON APPEAL

INTRODUCTION

Pursuant to the provisions of 37 CFR Part 41, Subpart B, applicants hereby appeal to the Board of Patent Appeals and Interferences (the "Board") from the examiner's final rejection dated 10/18/2005. A notice of appeal was timely filed concurrently with this Brief on Appeal on 2/10/2006, in accordance with 37 CFR § 41.31(a)(1).

REAL PARTY IN INTEREST

The entire interest in the present application has been assigned to Hewlett-Packard Development Company, L.P., as recorded at reel 014061, frame 0492.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

02/13/2006 MBINAS 00000038 082025 10062250
03 FC:1402 500.00 DA

STATUS OF CLAIMS

Claims 1-4 and 10 are pending in the application.

Claims 1-4 and 10 have been finally rejected.

Claims 1-4 and 10 are on appeal.

STATUS OF AMENDMENTS

No after-final amendments have submitted.

SUMMARY OF CLAIMED SUBJECT MATTER

The application relates generally to automated image analysis, and more specifically to converting a gray-scale image into a binary image (bilevel thresholding). Figure 1 illustrates an example gray-scale image to be processed. Figures 2 and 3 illustrate binary images resulting from applying various bilevel thresholding algorithms to the image of figure 1. Figure 4 illustrates a binary image resulting from applying, to the image of figure 1, a bilevel thresholding method using an example embodiment of the invention. Details of the example method are discussed from page 5, line 20 to page 6, line 29. In summary, an intensity threshold is selected from two thresholds, one of which is a constant value over at least a region or block, and one of which is dynamic (may vary from pixel to pixel). In the specific example, the selected threshold is the highest intensity of the two alternative thresholds, and the dynamic threshold is the maximum intensity value (less an offset) of a block of pixels surrounding a pixel to be thresholded.

Claim 1 specifies selecting, for each pixel to be thresholded in the image, one threshold among a plurality of thresholds, based on the relative magnitudes of the thresholds (see, equation 1, page 5, line 31); and assigning each pixel to one of two classes according to the value of its intensity relative to the selected threshold for the pixel.

Claim 2, dependent from claim 1, further specifies selecting among at least one threshold that is dynamic, and a threshold that is constant (page 5. line 35 to page 6, line 29).

Claim 3, dependent on claim 1, further specifies selecting a threshold corresponding to the highest intensity value among the plurality of thresholds (equation 1, page 5, line 31 assumes that small numbers = low intensity and high numbers = high intensity. Specifying "intensity value" instead of "magnitude" includes the case in which high numbers = low intensity).

Claim 4, dependent on claim 1, further specifies selecting the threshold having the largest magnitude among the plurality of thresholds (see, equation 1, page 5, line 31).

Claim 10 specifies an apparatus executing the method of claim 1.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Whether claims 1-4 and 10 are unpatentable under 35 U.S.C. § 102 as anticipated by U.S. Patent Number 5,838,463 (Gahang).

ARGUMENT

CLAIMS 1, 3. 4, AND 10

Claims 1 and 10 specify: selecting one threshold among a plurality of thresholds, based on the relative magnitudes of the thresholds. Gahang does not teach or suggest selecting a threshold based on the relative magnitudes of the thresholds.

Applicant stipulates that Gahang discloses a plurality of thresholds, and the issue is what criteria are used for selecting a threshold for each pixel. The applicant contends that Gahang selects a threshold based on the value of two counters, one driven by a pixel clock, and the other driven by a line clock. The selection criteria in Gahang is not related to relative magnitudes of thresholds.

Gahang, figure 2, illustrates a Binary Image Determining Unit 36 receiving 6-bit digital image data (EP) from box 28, and 6-bit threshold data from Threshold Generator 35. The output of Unit 26 is binary, and Data Output Unit 40 determines whether the binary data is sent to one of two destinations (see, for example, Column 6. lines 8-17 and

lines 26-32). Threshold generator 35 has a 4x4 matrix of stored thresholds (figure 8B), and the stored contents depend on whether the binary image processor 2 is processing a half-tone image or text and lines (see, for example, column 16, lines 26-57). If the image processor is processing text and lines, all sixteen threshold values are the same (peak-voltage divided by 8) (see column 16, lines 42-50). If the image processor is processing a half-tone image, the 4x4 matrix is filled with sixteen data values stored in advance in memory 16 (see column 16, lines 35-41). For any given image pixel, the threshold to which the image pixel is compared is determined by a first counter 310 driven by a pixel clock CKPX, and a second counter 312 being driven by line clock CKLN (see figure 8A and column 16, line 58 to column 17, line 57). That is, the threshold is determined by the state of two counters being driven by pixel and line clocks. Effectively, the threshold is determined by the line and column number of the pixel. The image pixel at line 0, column 0 in the digital image would be compared to threshold t0 in figure 8B, the image pixel at line 0, column 1 in the digital image would be compared to threshold t1 in figure 8B, and so forth. If, for example during half-toning, the digital image was a uniform shade of gray, comparing each image pixel to its corresponding entry in the matrix of figure 8B would result in an arrangement of dots that, on average, appear to the human vision system as a shade of gray. For any one digital image pixel, the processor is either in line and text mode, or is in half-tone mode, the entry in the 4x4 threshold matrix is determined by the mode, and only one entry is used as the threshold. The selection of a threshold depends only on two counter values being driven by pixel and line clocks. There is no selection of thresholds based on the magnitude of the thresholds, as specified in claims 1 and 10.

In the final office action mailed 10/18/2005, the examiner provides no citation to Gahang to support an argument that Gahang selects a threshold based on the relative magnitudes of the thresholds. At page 2, last line, the examiner states: "the above delta thresholds are of relative magnitudes to each other". While that may be true mathematically, it is irrelevant to what is claimed. The applicant stipulates that Gahang teaches a plurality of thresholds, and from basic mathematics numbers have relative values However, claim 1 specifies selection based on relative values, and that is not taught or suggested in Gahang.

CLAIM 2

Claim 2 specifies selecting among at least one threshold that is dynamic, and a threshold that is constant. Gahang does not teach or suggest selecting among at least one threshold that is dynamic, and a threshold that is constant.

In the final office action mailed 10/18/2005, on page 4, regarding claim 2, the examiner cites Gahang, figure 2, and column 18, lines 29-31. The cited text states that the threshold data (THR) being generated by the Threshold Generator 35 is either with automatic gain control or a constant value.

From column 6, lines 33-45, the voltage peak controller is subject to automatic gain control, and from column 16, lines 43-50, in text and line drawing mode, all the thresholds are set to the peak voltage divided by eight. Accordingly, in text and line drawing mode, when the peak voltage changes, the 16 identical thresholds being sent to Binary Image Determining Unit 36 may be changed to a new set of 16 identical thresholds. For any given pixel, Unit 36 selects one threshold out of the 4x4 matrix, all of which may have been constant, or all of which may have just changed. However, there is no teaching or suggestion that the Binary Image Determining Unit 36 selects among at least one threshold that is dynamic, and a threshold that is constant.

CONCLUSION

In view of the above, applicant respectfully requests that the examiner's rejection of claims 1-4 and 10 be reversed.

Respectfully submitted,

A. W. Winfield

Augustus W. Winfield

Reg. No. 34,046

February 10, 2006

Fort Collins, CO 80528-9599

(970) 898-3142

CLAIMS APPENDIX

1. A method of segmenting an image, comprising:

selecting, for each pixel to be thresholded in the image, one threshold among a plurality of thresholds, based on the relative magnitudes of the thresholds; and

assigning each pixel to one of two classes according to the value of its intensity relative to the selected threshold for the pixel.

2. The method of claim 1, further comprising:

selecting among at least one threshold that is dynamic, and a threshold that is constant.

3. The method of claim 1, further comprising:

selecting a threshold corresponding to the highest intensity value among the plurality of thresholds.

4. The method of claim 1, further comprising:

selecting the threshold having the largest magnitude among the plurality of thresholds.

10. An image processing system, comprising:

a processor having an input for receiving a digital image;

a memory medium, readable by the processor, containing a program to instruct the processor to perform the following method:

selecting, one threshold among a plurality of thresholds, based on the relative magnitudes of the thresholds; and,

assigning each pixel in the digital image to one of two classes according to the value of its intensity relative to the selected threshold for the pixel.

EVIDENCE APPENDIX

Does not apply.

RELATED PROCEEDINGS APPENDIX

Does not apply.